

SCIENCE

Chapter1: Nutrition in Plants



Nutrition in Plants

What is Nutrition?

- **Nutrition** is the mode of taking in food by an organism and its utilisation by the body.
- **Nutrients in animal** - These are the substances required by our body for its growth, repair, work and maintenance of the body. Different types of nutrients are carbohydrates, fats, proteins, vitamins, minerals etc. Our daily energy need may vary according to our occupation, age, sex and under some specific conditions.
- The nutrients present in the food help living organisms to build their body and to grow and repair damaged parts of the body.

Modes of Nutrition

Autotrophic nutrition

Autotrophs can prepare their own food.

Heterotrophic nutrition

Heterotrophs cannot prepare their own food.

Autotrophic

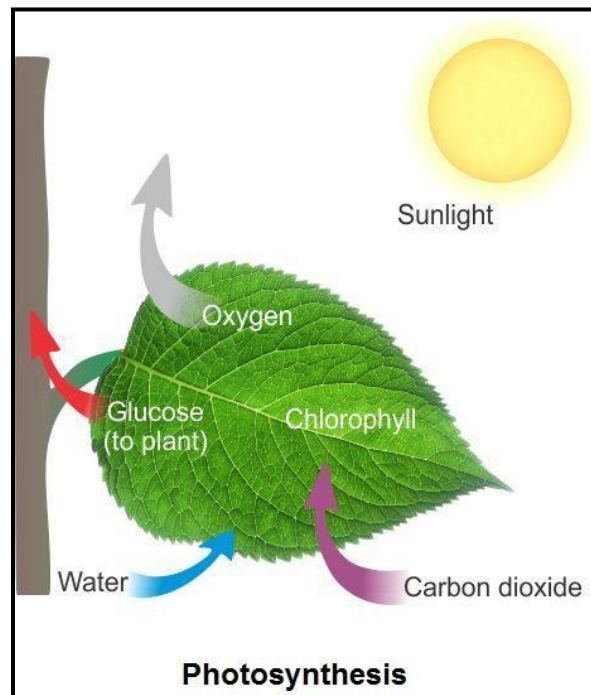
It is a mode of nutrition in which organisms prepare their own food. Inorganic molecules like CO_2 and H_2O are converted into organic molecules like carbohydrates in the presence of sunlight and chlorophyll.

E.g. Green plants. Autotrophs are further categorized as:

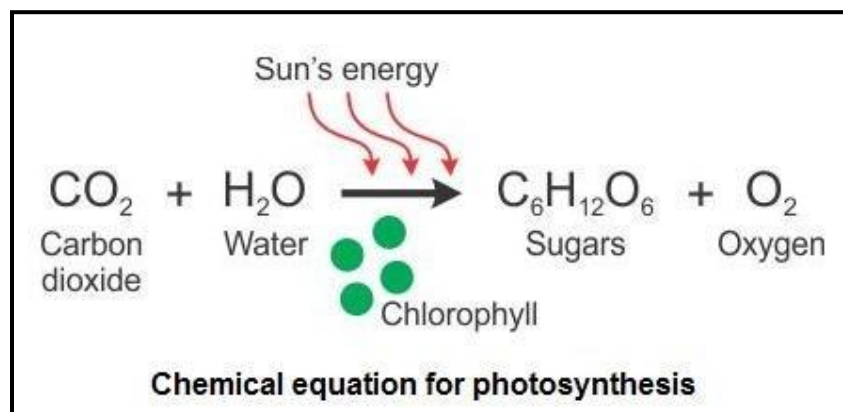
- **Photoautotrophs:** Those which utilize sunlight for preparing their food e.g. green plants.
- **Chemoautotrophs:** Those which utilize chemical energy for preparing their food, e.g. Purple sulphur bacteria.

Photosynthesis

- Plants prepare their own food in the presence of sunlight and the green pigment chlorophyll by a process termed as **photosynthesis**.
- The process of photosynthesis requires **carbon dioxide, water, minerals, sunlight** and **chlorophyll**.



- During photosynthesis, chlorophyll containing cells of leaves use carbon dioxide and water in the presence of sunlight to synthesise **carbohydrates** along with the release of **oxygen**.
- Carbohydrates ultimately get converted to **starch**, and hence, the presence of starch in leaves indicates the occurrence of photosynthesis.



Importance of Photosynthesis

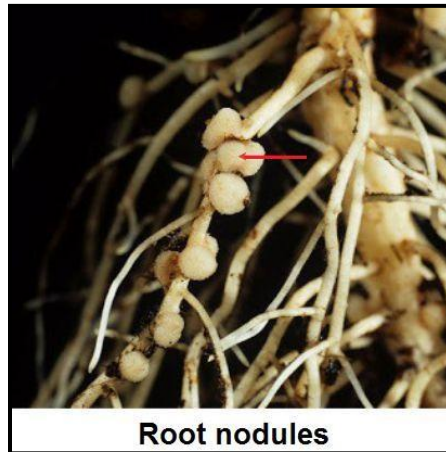
- Photosynthesis is a unique process where solar energy captured by leaves is stored as food in plants.
- The oxygen released in the atmospheric air during photosynthesis is useful because oxygen is required by all living beings including plants.

Synthesis of Plant food other than Carbohydrates

- The soil contains some nitrogen-fixing bacteria which convert gaseous nitrogen into

a more usable form and release it into the soil.

- These bacteria are present in the root nodules of leguminous plants. Example: **Rhizobium** is usually found in the roots of gram, peas, moong and other legumes.
- The plants provide food and shelter to the bacteria, and in return, the bacteria fix nitrogen for the plants.



- Certain plants convert carbohydrate into **oils** and store them in seeds. Example: Sunflower seeds. The oil obtained from plant seeds is commonly known as vegetable oil.
- **Vitamins** made by plants are contained in vegetables, fruits and cereals.
- Plants combine some of the carbohydrate (made during photosynthesis) with nitrate minerals (obtained from soil) to make **amino acids** which are then made into proteins.

Other Modes of Nutrition in Plants

- Some plants lack chlorophyll and hence, are unable to prepare their own food. This type of nutrition is termed as **heterotrophic** nutrition. Examples: Humans and all animals.

| Types of Heterotrophic Nutrition | Examples |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parasitic | <p><u>Cuscuta plant</u></p> <ul style="list-style-type: none"> • It does not have chlorophyll and consumes food prepared by other plants. |
| Insectivorous | <p><u>Pitcher plant</u></p> <ul style="list-style-type: none"> • It traps insects inside its pitcher and eats them. |

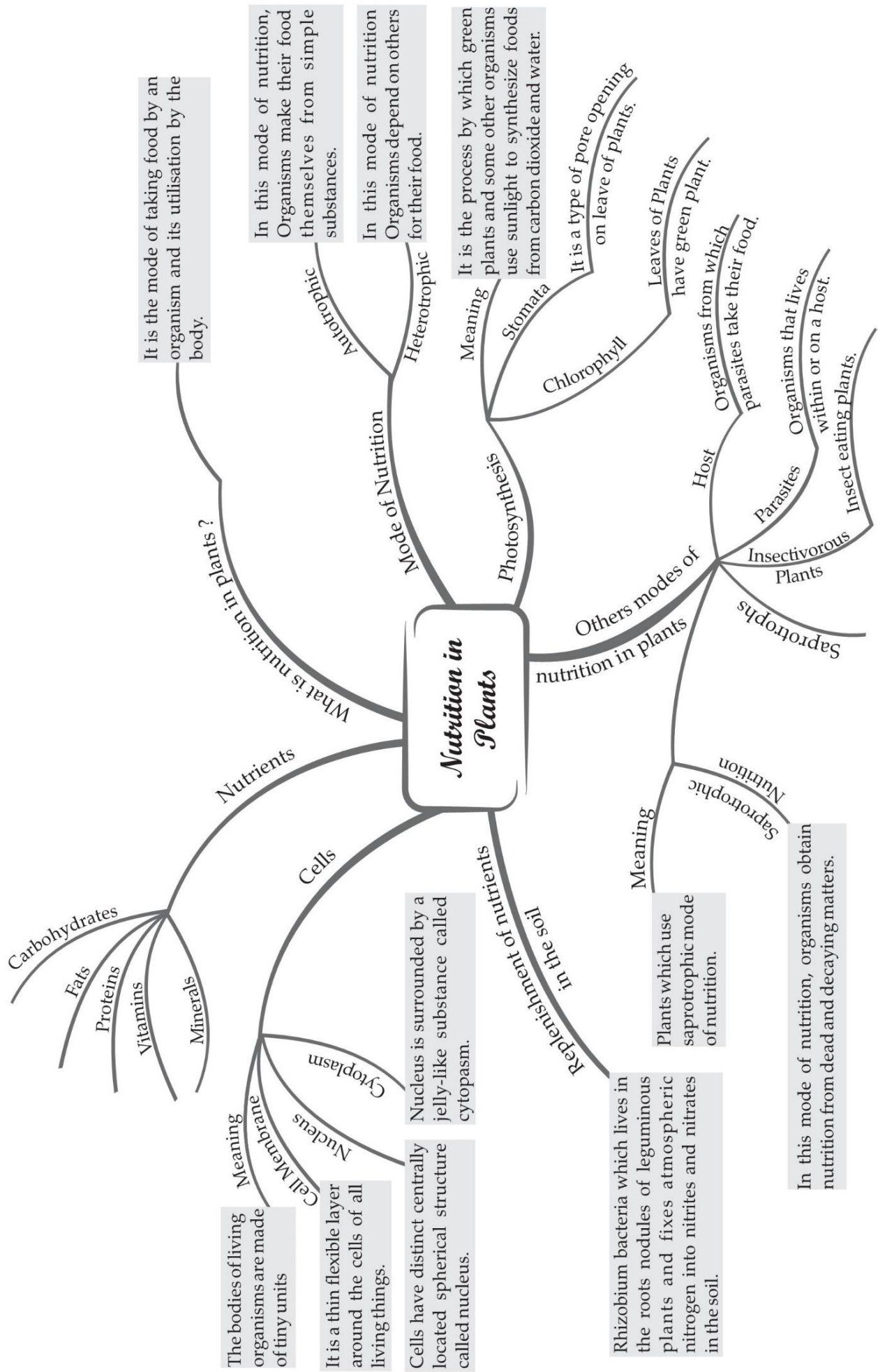
| | |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Saprophytic | <p><u>Fungi</u></p> <ul style="list-style-type: none">• These organisms take in nutrients from dead and decaying matter. <p><u>Mushroom</u></p> <ul style="list-style-type: none">• It takes nutrition from rotting wood of a dead tree. |
| Symbiotic association | <p><u>Lichen</u></p> <ul style="list-style-type: none">• Lichens are a symbiotic association between algae and fungus.• The fungus provides shelter, water and minerals to the alga, which in return provides food to the fungus.• Algae contain chlorophyll and hence, are able to prepare food. |

Replenishment of Nutrients in Soil

- Plants use nutrients available in the soil. Due to this, the amount of nutrients keeps declining in the soil.
- **Fertilisers** and **manures** which contain phosphorus, potassium, nitrogen etc. are constantly added to the soil from time to time to enrich the soil.
- Gardeners also use fertilisers in lawns and potted plants.
- Two common types of fertilisers are **NPK** (Nitrogen, Phosphorus and Potassium) and **Urea**.
- In addition, the association between nitrogen-fixing bacteria and plants provides nitrogen, and hence, farmers need not add nitrogen fertiliser to the soil where leguminous plants grow.

MIND MAP : LEARNING MADE SIMPLE

CHAPTER-1



Important Questions

➤ Multiple Choice Questions:

Question 1. Fungi is a

- (a) parasite
- (b) autotroph
- (c) saprotroph
- (d) insectivore

Question 2. Human beings can be categorized as

- (a) parasite
- (b) heterotrophs
- (c) saprotrophs
- (d) autotrophs

Question 3. Human beings get food from

- (a) plants
- (b) animals
- (c) neither (a) or (b)
- (d) both (a) and (b)

Question 4. Parasites obtain their food from

- (a) insects
- (b) plants
- (c) animals
- (d) all of these

Question 5. Which part of plant is called food factory?

- (a) Fruits
- (b) Seeds
- (c) Leaves
- (d) Flowers

Question 6. The green pigment that is present in the leaves are called

- (a) haemoglobin
- (b) globulin

(c) albumin

(d) chlorophyll

Question 7. Which of the following is an insectivorous plant?

(a) Pitcher plant

(b) Cuscuta

(c) Algae

(d) Lichens

Question 8. Which of the following is a nutrient?

(a) Fats

(b) Vitamins

(c) Proteins

(d) All of these

Question 9. The organisms which prepare their own food are known as

(a) saprotrophs

(b) autotrophs

(c) heterotrophs

(d) none of these

Question 10. _____ is essential for all living organisms.

(a) Protein

(b) Fat

(c) Food

(d) None of these

Question 11. Photosynthesis will not occur in leaves in the absence of

(a) guard cells

(b) chlorophyll

(c) vacuole

(d) space between cells

Question 12. The raw materials used for photosynthesis are:

(a) CO₂, O₂, H₂

(b) CO₂, water

(c) N₂, water

(d) O₂ water

Question 13. The process by which green plants prepare their own food in the presence of sunlight is called

- (a) saprophytic nutrition
- (b) photosynthesis
- (c) cellular nutrition
- (d) nutrition

Question 14. Ultimate source of energy is

- (a) chemical energy
- (b) wind energy
- (c) solar energy
- (d) water energy

Question 15. Which one of the following is an autotroph?

- (a) Lichens
- (b) Algae
- (c) Fungus
- (d) Cuscuta

➤ **Fill In the Blanks:**

1. Solar energy is stored in leaves with the help of
2. All green plants are called
3. Plants and animals which depend on others for their food are called
4. The help in the opening and closing of the stomata.
5. Plants can synthesize components of food other than carbohydrates such as and
6. In nutrition organisms prepare their food themselves

➤ **True or False:**

1. Green plants are autotrophs.
2. Oxygen is not released during photosynthesis.
3. Yeast and mushrooms are useful for us.
4. Food is essential for all living organisms.
5. The sun is the ultimate source of energy for all living beings.
6. The cell is enclosed by a thin outer boundary called cytoplasm.

➤ **Very Short Question:**

1. Name some components of food.
2. Define nutrients.
3. Give an example of autotrophs.
4. Give an example of heterotrophs.
5. Plants prepare their food by using raw materials present in _____.
6. What do you mean by nutrition?
7. Name the food factories of plants.
8. Name the tiny pores present on the surface of leaves.
9. Name the green pigment present in leaves.
10. _____ helps leaves to capture the energy of sunlight

➤ Short Questions:

1. What is Nutrients?
2. How humans and animals are directly or indirectly dependent on plants.
3. What is food?
4. Why do we need food?
5. How do plants obtain the raw materials from the surroundings?
6. What is cell?
7. What is the cell membrane?
8. What is tissue?

➤ Long Questions:

1. Sun is called the ultimate source of energy for all living organisms. Comments.
2. What is Symbiosis? What is Symbiotic relationship?
3. Explain the two mode of nutrition in plants.
4. What are stomata? Explain their function.
5. How is sunlight used by the plant for photosynthesis?

✓ Answer Key-

➤ Multiple Choice Answers:

1. (c) saprotroph
2. (b) heterotrophs
3. (d) both (a) and (b)
4. (d) all of these

5. (c) Leaves
6. (d) chlorophyll
7. (a) Pitcher plant
8. (d) All of these
9. (b) autotrophs
10. (c) Food
11. (b) chlorophyll
12. (b) CO₂, water
13. (b) photosynthesis
14. (c) solar energy
15. (b) Algae

➤ **Fill In the Blanks:**

1. Chlorophyll
2. Autotrophs
3. Heterotrophs
4. Guard cell
5. Proteins, fats
6. Autotrophic

➤ **True or False:**

1. True
2. False
3. True
4. True
5. True
6. False

➤ **Very Short Answers:**

1. Answer: Carbohydrates, proteins, fats, vitamins and minerals.
2. Answer: Carbohydrates, proteins, fats, vitamins and minerals are essential components of food, these components are called nutrients.
3. Answer: All green plants.
4. Answer: Animals and human beings.
5. Answer: Surrounding

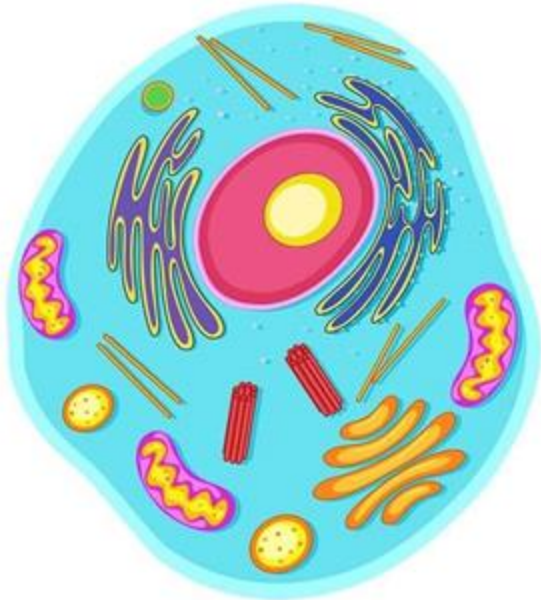
6. Answer: Nutrition is the mode of taking food by an organism and its utilization by body.
7. Answer: Leaves
8. Answer: Stomata
9. Answer: Chlorophyll
10. Answer: Chlorophyll

➤ Short Answer:

1. Answer: Carbohydrates, proteins, fats, vitamins, and minerals are components of food. The chemical substance present in components of food is necessary for our body and is called nutrients.
2. Answer: All living organisms require food. Plants can make their food themselves but animals including humans cannot. They get it from plants or animals that eat plants. Thus, humans and animals are directly or indirectly dependent on plants.
3. Answer: Food is the source of energy, and every cell of an organism gets energy by the breakdown of glucose. The cells use this energy to carry out vital activities of life.
4. Answer: Living organisms need food to build their bodies, to grow, to repair damaged parts of their bodies and provide the energy to carry out life processes.
5. Answer: Water and minerals present in the soil are absorbed by the roots and transported to the leaves.

Carbon dioxide from air is taken in through the tiny pores present on the surface of the leaves. Such pores are called stomata. These pores are surrounded by 'guard cells.

6. Answer: The bodies of living organisms are made of tiny units called cells therefore Cell are called the building blocks of living organism. Cells can be seen only under the microscope. Some organisms are made of only one cell. They are called Unicellular Ex. Amoeba, Paramecium etc. Living organism made up of many cells are called Multicellular like man, tree etc.



A Cell

7. Answer: The cell is enclosed by a thin outer boundary, called the cell membrane. Most cells have a distinct, centrally located spherical structure called the nucleus. The nucleus is surrounded by a jelly-like substance called cytoplasm.
8. Answer: A tissue is a group of cells that perform specialized function in an organism. For example, the vascular tissue for the transport of water and nutrients in the plant is called the xylem.



Tissue

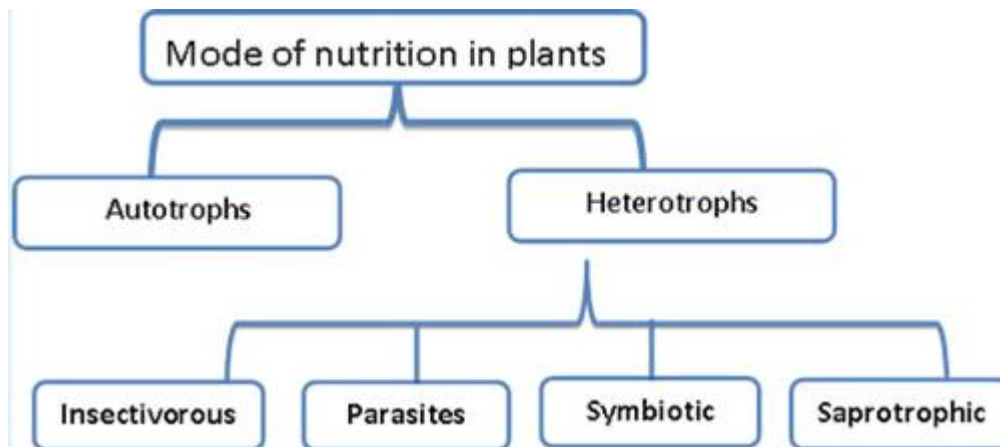
➤ Long Answer:

1. Answer: The solar energy is very important to carry out the process of photosynthesis, it is captured by the leaves and stored in the plant in the form of food. And this in turn use by other organism to get food to obtain energy. Thus, we say that sun is the ultimate source of energy for all living organisms.
2. Answer: Symbiosis: It is the type of nutrition in which two different kinds of depend on each other for their nutrition. In this both the organisms are benefited by each other. Example: Lichen. In this one alga and one fungus live together and remain in

symbiotic relationship.

Symbiotic Relationship: Some organisms live together and share shelter and nutrients. This type of relationship is called symbiotic relationship.

3. Answer:



Autotrophs or Autotrophic: – In this mode of nutrition organisms make their food themselves from simple substances. All green plants are Autotrophs (Auto means self and trophs means nourishment)

Heterotrophs or heterotrophic: – Heterotrophic organisms are those who obtain food from other organisms. Since these organisms depend on other organisms for their food, they are called consumers. All animals and non-green plants like fungi come under this category.

4. Answer: Stomata are tiny pores on the underside of the leaf surface that are surrounded by guard cells. Their functions are to exchange gases by diffusion for photosynthesis and respiration and to cause transpiration by evaporation of water from the leaf surface.
5. Answer: Sunlight is the energy source for photosynthesis. It is trapped by the green pigment chlorophyll that is present in the leaves and all green parts of the plants. The chlorophyll is present in organelles called chloroplasts. Most of the chlorophyll is present in the leaves and therefore leaves are the major site for trapping sunlight to convert it to chemical energy.